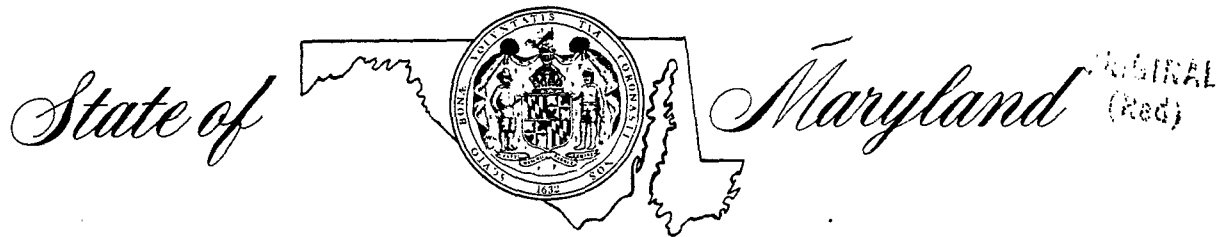


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OFFICE OF ENVIRONMENTAL PROGRAMS
DEPARTMENT OF HEALTH AND MENTAL HYGIENE

201 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201 • AREA CODE 301 • 225-5700
TTY FOR DEAF: Balto. Area 383-7555
D.C. Metro 565-0451

Adele Wilzack, R.N., M.S., Secretary

William M. Eichbaum, Assistant Secretary

September 10, 1986

Ms. Stephanie Del Re
Remedial Project Manager
U.S Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

Dear Ms. Del Re:

We have received and reviewed the second draft of the Remedial Investigation on the Limestone Road site. Generally, the second draft reiterates the findings of the first draft and continues to apply a gloss of assumptions to groundwater flow, local geology and the extent of contamination.

The following are the State's comments, first general and then the specific comments:

I. General Comments:

1. This comment has been addressed. The second draft of the report has been made more direct.
2. The report has presented and considered alternate hypotheses for the data. However, the report is not thorough in its assessment of all the different alternatives.
3. This comment has not been addressed.
4. The hydrogeologic assessment has been drastically improved in the second draft of the RI. However, there are still some concerns with this section (see the following specific comments).

AR301491

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5. This comment has been addressed and it appears that most of the inaccuracies of the report have been corrected in the second draft.
6. This comment has not been addressed (see the specific comments, no. 3).
7. This comment has not been addressed (see the specific comments, no. 17).
8. Some of the concerns of this comment have been addressed.
9. This comment has not been addressed.

II. Specific Text Comments:

1. This comment has been addressed and corrected.
2. This comment has been addressed and the second draft of the RI now reflects WMA's concern that groundwater may be moving parallel to fractures in the bedrock.
3. This comment has not been addressed. Various organic and inorganic constituents are present in samples of sediment, surface water, soil, and groundwater that were presumed to be background. Secondly, a location considered in the text as background has parameters labeled as > or 5x > background. How can this be?
4. This comment has been addressed and now the RI states more clearly how it concluded that groundwater was in contact with the contents of the Cumberland City Dump.
5. This comment has been addressed.
6. This comment has not been addressed. WMA still maintains that appropriate conclusions can be made without the inclusion of the Cumberland City Dump into the RI. There is ample evidence present in the RI to make some definite conclusions and responsible recommendations.
7. This comment has not been addressed. There is a large body of background geological information pertaining to this area that has not been consulted. At a site where the geology is as complex as Limestone Road (by the RI's own admission), a thorough understanding of the site is needed to evaluate the flow of groundwater and the movement of contaminants from the site.

AR301492

8. This group of comments has been addressed; however, the entire section on Groundwater is poorly rewritten. There are whole sections that have been duplicated, some sentences are poorly written, and the thoughts between paragraphs are poorly connected.

a. This comment was addressed but the revision is still inadequate. What type of divide is Irons Mountain and what is its importance in separating the Cumberland and Warrior Mountain Water Provinces? Isn't this merely a surface water divide?

b-f. These comments have been addressed.

g. This comment has not been addressed. Although the report is technically correct in using the terms "phreatic" and "vadose", these terms are not at all descriptive of the site aquifer conditions.

9. This comment has not been addressed. The RI still raises the issue that the Cumberland City Dump contains "house-hold hazardous waste", but no where in the report is this verified.

10. This comment has not been addressed.

11. This comment has not been addressed. The goals of the RI from the beginning were to "...characterize the aquifer conditions and determine groundwater flow directions...", yet the RI states that the aquifer conditions across the site are variable and there is no consensus of how or where groundwater flows from underneath the site.

12. This entire group of comments has not been addressed.

a. It is imperative that basic data such as the strike and dip of the major geologic structures (bedding, fractures, and anticlines) be included in the text of the RI so that future workers or readers unfamiliar with the area can evaluate the data.

b-e. These group of comments relate specifically to the RI's "alleged" fractures. The RI lacks any morphological, geometrical, or dynamic description about the various observed fractures in the area. This type of information is basic to the analysis and understanding of fractures.

f. This comment has been addressed adequately. In fact, the RI now contains a discussion on the fractured nature of the bedrock and

AR301492

AR301493

groundwater flow. However, as stated before in a letter, the potentiometric lines (or maps) only indicate potential direction of groundwater flow (see also comment 15).

g. Where are all the boring and monitoring well logs? The RI only has logs for monitoring wells 3, 5, 9, A1, B1, C1, D1, EB1, EB2, EB3.

13. This comment has not been addressed. By labeling these figures as being normal to strike, a person unfamiliar to the area will be able to understand the site geology better.

14. This comment has been addressed. The groundwater contour map (potentiometric map) has been redrawn and now portrays the possible site conditions more realistically.

15. This comment has been addressed. Now, the RI presents and considers the possibility that groundwater flow may be controlled by the fractured bedrock. However, there are still some concerns with some of the RI's statements and conclusions.

a. pp 4-4 through 4-6. The discussion on the groundwater gradient, both in the text and in Appendix C, is a simplistic view of groundwater flow that is contradicted by data in Table C-1. The text states that wells located in "upland areas" generally have slight downward gradients. However, the data in Table C-1 shows that MW 5/6 and MW 9/10 have strong downward gradients, MW 1/2 have a slight upward gradient and only MW 3/4 have a slight downward gradient. In addition, the text states that wells located in valleys generally have a strong upward gradient. However, the data in Table C-1 shows that of the four well clusters in valleys, one has a slight upward gradient (MW 11/12), one has a moderate upward gradient (MW 7/8), one has a strong upward gradient (MW B1/B3), and one has a strong downward gradient (MD D1/D2).

b. p 4-5. A potentiometric map does not indicate "... the principal direction of groundwater flow...", it only indicates the potential for groundwater flow. However, when other complicating factors such as fractures, variable vertical and horizontal gradients (an uneven aquifer surface) and the presence of different lithologies, potentiometric maps are not useful in determining groundwater flow directions. This same concept must be changed in Appendix C, pp. C-3, C-4 and C-5.

c. p. 4-8. The text states that it is "...probable that sufficient vertical fractures exist (perpendicular to strike) to allow flow a same direction as the gradient." However, from the boring logs supplied in the Appendix (Appendix TM 7-1) the fractures parallel to bedding are the

AR301494

only ones described. Where are these other fractures and what are they related to?

d. p. C-3. There is no evidence that the principal component of groundwater flow is cross-strike (i.e., normal to the bedding and the bedding plane fractures), nor is this fact obvious from any figure in the RI. Again, the potentiometric map can only be used to indicate the potential direction of groundwater flow. The argument used to substantiate cross-strike flow vs. parallel-strike flow is useful, but exactly wrong in logic. Consider this: MWA1, MW3, and MW11 are all parallel to strike and to each other, and they are all screened at approximately the same topographic elevation. Thus, they are quite likely to be in the same, or similar stratigraphic unit and under the same conditions. MWA1 and MW3 are both on a high plateau, and they both have similar groundwater head elevation. MW11 is downgradient and in a valley. It also has a lower groundwater head elevation than MWA1 and MW3. Thus, there is evidence of a gradient parallel to strike, and more importantly, there is no evidence of similar head levels at similar topographic elevations parallel to strike. The same cannot be said for cross-strike flow.

A similar relationship is seen between MWC3, MW9 and MW8. These wells are all screened at similar depths, and are parallel to each other and to strike. The upgradient well (MW9) has the highest head elevation, while the two downgradient wells in either direction parallel to strike, have lower elevations that agree with one another.

e. p. C-13. Fractured media can only be assumed to behave as a porous media in a direction that is parallel to the fractures.

f. pp. C-13 and C-14. There is a large discussion about fracture porosity and how it does not add considerably to the groundwater flow. However, the amount of porosity that the fractures contribute is not of concern, it is the degree of interconnectivity of the fractures that makes them significant to groundwater flow. The shales already have a good porosity. The importance of a well-developed set of fractures is that they increase the permeability of the rock.

g. p. C-16. Groundwater flow through a series of interconnected joints has not been proven by this RI. It has been assumed, and there is no indication as to which fractures are important, or how groundwater moves in those fractures.

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From all of the above, it is apparent that the groundwater flow is very complex, and that the nature of the fracture flow and the distribution of the lithologies beneath the site are at the core of the problem.

16. This entire group of comments has not been addressed. Statements about what the rock can and cannot contribute to the groundwater are hindered by this missing data. According to WMA references, the chemical composition of all 9000 feet of the Devonian Shales does not vary much. For the RI to make this point, additional supportive data needs to be used. All the comments from our first letter still need to be addressed.

17. This comment has not been addressed. The temporal aspect with regards to the sampling data, especially from the monitoring wells, has not been considered. First, many of the inorganics in the monitoring wells (Tables 4-14, 15 and 16) seem to decrease in concentration over time. Second, many of the organics appear to follow this trend too. A reason for the former may be that the well drilling activity disturbed the rock and it has taken some time for all the rock particles to flush out. A reason for the later may be that the material used to construct the wells (PVC) caused some minor contamination. Bis (2-ethylhexyl) phthalates is a common byproduct of PVC. Since most of the wells only have this compound, and it only occurs at low levels, its presence may be due to the well material. (MWC1 and MW9 (consistently) have elevated values for B(2-E)P which must be considered to be from a different source.)

Finally, why wasn't sampling consistent from one phase to another? For example, Figure 4-20, the locations for surface water sampling varied during all the phases. Also, in Figure 4-18, why weren't all the monitoring wells sampled in Phase III?

18. This comment has been considered and corrected.

19. This comment has not been addressed. The data shows that the organic contamination at both the Diggs and the CC & SC properties are widespread. The comments that WMA made in its first letter are still valid and need to be considered.

20. This comment has been addressed.

21. This comment has been addressed.

22. This comment has been addressed and corrected.

23. Overall, the migration pathways are more thorough. However discussion is not site specific, but general in nature.

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24. This comment has not been addressed.

25. This comment has not been addressed. Again, the text refers to the background levels of organic and inorganic constituents, but these levels are not clearly illustrated in a table or figure. A similar comment has been made under comment 3.

26. These comments have not been addressed. Only inorganics have been detected in groundwater monitoring wells. No. 1,1,2-TCA, TCE, or PCE were found in the monitoring wells. Also, why are the sample analysis from the FIT Site Investigation mentioned here when that data is not provided in the RI?

27. This comment has not been addressed. In fact, this entire section, which was useful, has been deleted from the text of the report.

28. This comment has not been addressed.

29. This comment has not been addressed. Why does the summary discuss the risk related to chloroform in the groundwater? Chloroform was only found in a few monitoring wells in Phase I, and at concentrations of less than 5 ppb. Furthermore, the discussion on page 4-29 on the RI relates the occurrence of chloroform in the groundwater samples to possible laboratory contamination.

30. This comment has not been addressed.

31. This comment has not been addressed.

32. This comment has not been addressed.

In summary, the Remedial Investigation is not a complete investigation of conditions at the site. We believe that the RI, within its limitations, provides a sound basis for a limited response at this time and further definition of the extent of contamination. However, the Remedial Investigation should not be presented as a conclusive review of the site.

AR301497

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If you have any questions, please contact me at (301)-225-5700.

Sincerely,

Arthur N. Caple

Arthur N. Caple
Acting Administrator
Enforcement Program

ANC:amj

cc: Mr. Ronald Nelson
Mr. Frank Henderson
Mr. Robert Creter
Mr. David Healy
Mr. Theodore Meyer

AR301498
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